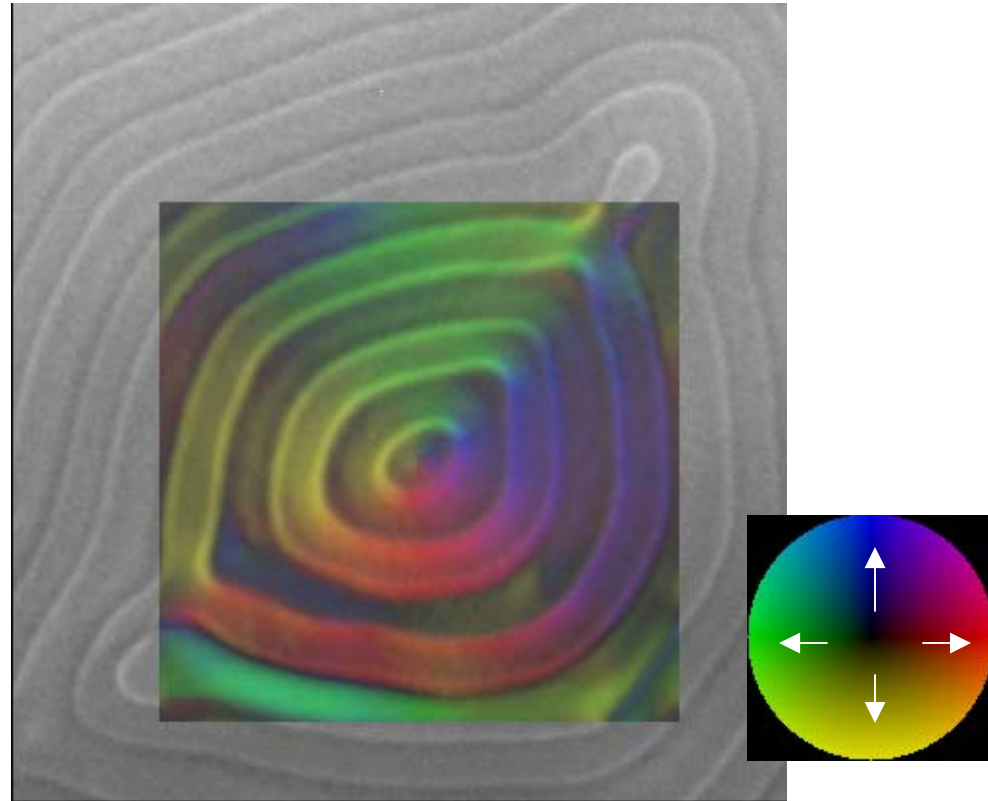


Microstructure and Properties of the Ferromagnetic Shape Memory Alloy Ni_2MnGa

Marc De Graef, Carnegie Mellon University, DMR-0095586

Ferromagnetic shape memory alloys are metallic materials that can change their shape when a magnetic field is applied. They can be used as actuators in a variety of applications. The microstructure of these materials is complex, and requires transmission electron microscopy studies to determine the magnetic domain configurations. In this work, we have developed a method to determine how the magnetic moments inside the material are oriented. This allows us to study interactions between magnetic domain walls and other microstructural features, which ultimately determine the functionality of the material.

IEEE Trans. Magn. **37**, 2663 (2001).



Experimental image and reconstructed magnetization pattern (color) for a circular magnetic domain configuration in Ni_2MnGa . The color corresponds to the direction of the local magnetization vector. The image measures 10 microns on the side.

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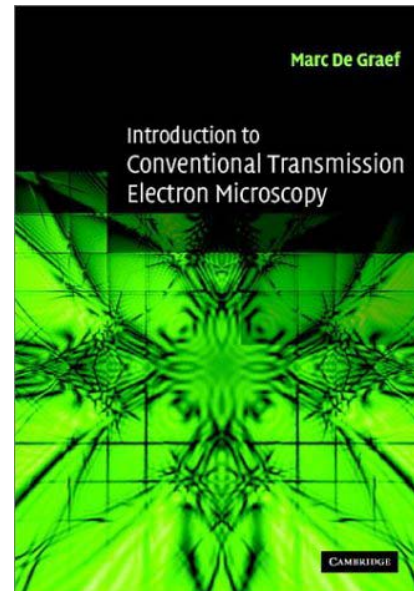
Education:

One graduate student, Sai Prasanth Venkateswaran, has been involved in this research. The educational activities have centered on the development of an interactive website (<http://ctem.web.cmu.edu>) which accompanies a graduate level textbook written by the PI on the operation of a transmission electron microscope.

Currently, the PI is writing an undergraduate textbook on crystallography and diffraction, along with M. McHenry (CMU Materials Department). Both books are under contract with Cambridge University Press and are written with NSF financial support. Undergraduate students are helping out with both the websites and the illustrations.

Outreach:

The PI is a Research Associate with the Carnegie Museum of Natural History in Pittsburgh (Hillman Hall of Minerals and Gems). When unknown minerals need to be identified, the PI and undergraduates of the Materials Department carry out the necessary observations, using x-ray diffraction and scanning electron microscopy methods.



Front cover of the textbook written by the PI (Cambridge University Press, ISBN: 0521620066)